REMARKS/ARGUMENTS

Applicants note the receipt of a Notice of Non-Compliant Amendment. Applicants present herewith a copy of the revised claims thereby complying with the Voluntary Revised Amendment Practice.

Status of the claims

Claims 1-10 are pending and under examination. Claims 18-21 are canceled without prejudice to subsequent revival. Claims 1, 7, and 9 have been amended for the purpose of providing improved clarity. These amendments add no new matter. Support for these amendments can be found in the claims as filed. No claim amendment should be construed as an acquiescence in any ground of rejection.

Rejection under 35 U.S.C. § 101

Claim 9 is rejected under 35 U.S.C. § 101 as allegedly directed to non-statutory subject matter. In response, applicants have amended the claim to clarify that the seed is transgenic. Accordingly, applicants respectfully request that the rejection be withdrawn.

Rejections under 35 U.S.C. § 112, second paragraph

Claims 1-10 are rejected under 35 U.S.C. § 112 for allegedly failing to particularly point out and distinctly claim the subject matter which the applicant regards as his invention.

Claim 1 is rejected for reciting the terms "strong infectivity," "gene," "a promoter," "transformed cells operably linked," and "the antibiotic." In response, applicants have amended claim 1 to provide greater clarity.

Claim 7 is rejected for reciting the term "de-differentiation." Applicants respectfully traverse. The term "de-differentiation" as used in claim 7 is a term commonly used in the art and refers to the process whereby a seed or explant develops into a callus. Accordingly, a medium that promotes de-differentiation is one that provides for such development and growth. Such media are well known in the art and typically comprise plant growth hormones.

Rejections under 35 U.S.C. § 112, first paragraph

Claims 8 and 9 are rejected as allegedly containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. According to the Action, no phenotype or genotype of a transgenic turfgrass plant or seed prepared by the method of claim 1 is described. In response, applicants respectfully traverse.

The Action cites *University of California v. Lilly & Co.*, 43 USPQ2d 1398 (Fed. Cir. 1997) for the proposition that an adequate description of claimed DNA requires a precise definition of the DNA sequence itself, not merely a recitation of its function or reference to a potential method for isolating it. More recent Federal Circuit Court decisions, however, have since clarified *Lilly* and have held that *Lilly* **does not** apply in instances where the claim terms at issue are not unknown biological materials that ordinarily skilled artisans would easily miscomprehend. (see *Amgen Inc., v. Hoechst Marion Roussel Inc.*, 314 F.3d 1313 (Fed. Cir. 2003)).

The claims at issue are directed to transgenic plants produced by a novel *Agrobacterium*-mediated transformation protocol. Applicants assert that transgenic plants are not unknown biological materials that skilled artisans would easily miscomprehend. Methods of determining whether or not a plant is transgenic, *i.e.,* by screening transgenic plants for the presence of transgenes, are well known in the art. For example, Northern or Western blots can be used to detect and quantify newly introduced mRNA or protein in a plant. Furthermore, in the examples section of the specification, the applicants provide detailed description of how they transformed and regenerated three different species of turfgrass plants. Example 2 describes the transformation and generation of a creeping bentgrass plant. On pages 25-26 of the specification, applicants describe how regenerable callus from a creeping bentgrass plant was produced from seed, co-cultivated with an *Agrobacterium* strain containing vector pSB111SH, placed on a selection and regeneration medium, and transferred to soil. Example 3 describes the transformation and generation of a tall fescue plant. On pages 27-29 of the specification, applicants describe how regenerable callus from a tall fescue plant was produced from seed, co-cultivated with an *Agrobacterium* strain containing vector pSB111SH, placed on a selection and regeneration medium, tested for GUS activity in order to determine that the transformation was successful, and transferred to a second regeneration medium to promote root growth. Example 4 describes the transformation and generation of a velvet bentgrass plant. On pages 29-31 of the specification, applicants describe how regenerable callus from a velvet bentgrass plant was produced from seed, co-cultivated with an *Agrobacterium* strain containing vector pSB111SH, placed on a selection and regeneration medium, tested for GUS activity in order to determine that the transformation was successful, and transferred to a second regeneration medium to promote root growth. Accordingly, it is

clear from the examples section of the specification that the inventors had possession of transgenic plants of the present invention characterized by the presence of a transgene. Accordingly, applicants submit that they provide a sufficient description of the transgenic plants as required by both *Lilly* and *Amgen* and respectfully request that the rejection of claim 8 and 9 under 35 U.S.C. § 112 be withdrawn.

First rejection under 35 U.S.C. § 112, first paragraph

Claims 1-10 are rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains to make and/or use the invention.

The Office Action cites Birch (Ann. Rev. Plant Physiology and Plant Mol. Biol., vol. 48, pages 297-326, 1997), Deroles *et al.* (1998, Molecular Biology 11:355-364), Dunwell *et al.* (1990, Outlook on Agriculture 19, 103-109), and Finnegan *et al.* (Bio/Technology 12:883-888, 1994) for the proposition that there are many obstacles to successful plant transformation, thereby, making the art highly unpredictable. In response, applicants respectfully traverse.

The enablement requirement of 35 U.S.C. § 112 mandates that the specification teach those skilled in the art how to make and use the claimed invention without undue experimentation. *See In re Wands*, 8 U.S.P.Q.2d 1400 (Fed. Cir. 1988). The test of enablement is **not** simply whether experimentation would have been necessary, but whether such experimentation would have been **undue**. *See In re Angstadt*, 190 U.S.P.Q. 214, 219 (C.C.P.A. 1976). The fact that experimentation may be complex does not necessarily make it

undue, if the art typically engages in such experimentation. *See Wands*, 8 U.S.P.Q.2d at 1404. Any conclusion of non-enablement must be based on the evidence as a whole. *Id.*

Applicants respectfully note that the Examiner bears the initial burden to establish a reasonable basis to question the enablement provided for the claimed invention. *In re Wright*, 999 F.2d 1557, 1562, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993) (examiner must provide reasonable expectation as to why scope of protection provided by claim is not adequately enabled by disclosure); MPEP §2164.04. The MPEP further states that a specification**must** be taken as being in compliance with the enablement requirement of 35 U.S.C. § 112, first paragraph, unless there is reason to doubt the objective truth of the statements contained therein which must be relied on for enabling support. *Id.* at 224. The MPEP also quotes *In re Marzocchi*, which states in relevant part:

> [I]t is incumbent on the Patent Office, whenever a rejection on this basis is made, to explain why it doubts the truth or accuracy of any statement in a supporting disclosure and to back up assertions of its own with acceptable evidence or reasoning which is inconsistent with the contested statement. Otherwise, there would be no need for the applicant to go to the trouble and expense of supporting his presumptively accurate disclosure.

439 F.2d at 224, 169 USPQ at 370. Applicants believe that the present rejection does not meet the *Marzocchi* standard, as articulated in the MPEP, for at least two reasons. First, the Office Action has inaccurately characterized the state of the art of plant transformation. Second, the Office Action takes the strained position that Applicants must do more than enable practice of the claimed methods in order to comply with the first paragraph of 35 U.S.C. § 112.

The Office Action Has Inaccurately Characterized the State of the Art of Plant Transformation

The present invention is based, in part, on the development of an *Agrobacterium*-mediated transformation system capable of efficiently and reliably transforming a turfgrass plant.

The Office Action takes the position that the state of the art of plant transformation is unpredictable and for that reason concludes that the specification does not provide enablement. The Office Action relies on four references to suggest that plant transformation techniques are unreliable. Applicants submit that the Office Action misinterprets these four references. The cited references in no way suggest that the art of plant transformation is unpredictable.

The Action cites Birch for the proposition that the art of plant transformation is unpredictable, yet, Birch suggests no such thing. The Action directs applicants attention to the author's statement on page 297 stating that "the major technical challenge facing plant transformation biology today is the development of methods and constructs to produce a high proportion of plants showing predictable transgene expression without collateral genetic damage" and mistakenly interprets it to imply that the art of plant transformation is unpredictable. A further reading of the review article, however, demonstrates that the author clearly did not intend such an interpretation. On page 298 of the Birch reference, the author states that the introduction and expression of foreign genes in plants has been mainly successful, "The capacity to introduce and express diverse foreign genes in plants, first described for tobacco in 1984, has been extended to over 120 species in at least 35 families. Successes include most major economic crops, vegetables, ornamental, medicinal, fruit, tree, and pasture plant." On page 304 of the Birch reference, the author notes that some species of

plants have been recalcitrant to transformation, but, that even these plants are capable of being transformed with the development of new transformation systems, "Cereals, legumes, and woody plants are commonly characterized as recalcitrant to transformation, because these group shave included a disproportionate number of untransformed or difficult to transform species. However, the generalization is becoming less useful as one species after another from these groups joins the list of plants with reliable transformation systems." The author concludes with the statement that "plant transformation is already sufficiently developed to allow the testing and even commercialization of plants with novel phenotypes under simple genetic control." It is clear from a reading of the Birch reference that the art of plant transformation and regeneration is not unpredictable at all. At most, the author suggests that a better understanding of some of the undesired side effects of transformation would increase the commercial expectations of plant transformation by limiting the need to screen large number of plants for desired expression patterns.

The Deroles reference also does not suggest that the art of plant transformation is unpredictable. In fact, the last paragraph of the article states just the opposite, "our results have confirmed previous reports regarding the ease of generating large number of transgenic plants rapidly using the *Agrobacterium* vector system." The fact that the expression of introduced genes is attenuated in some instances in no way indicates that the art of transformation is unpredictable. Similarly, neither the Finnegan reference nor Dunwell reference suggests that the art of transformation is unpredictable. Finnegan concludes that in order to realize the full potential of agricultural biotechnology in the 21^{rst} century, the phenomenon of transgene instability should be investigated. Dunwell suggests that field tests should be performed. It is clear from a reading of these references that they do not stand for

the proposition that the art of plant transformation is unpredictable, but at most that more research should be done in order to realize the full commercial potential of transgenic crop growth. Given the successes of plant transformation techniques, the Office Action has clearly ignored the state of the art and has mischaracterized it as unpredictable. Whether or not every transformation technique or transgenic crop will have immediate commercial success is not relevant to a determination of unpredictability.

The Specification Provides Sufficient Guidance to Practice the Claimed Invention.

After reviewing the pending claims, the Examiner should find this invention does not require undue experimentation. As identified in the Patent Office and the Federal Circuit, whether undue experimentation is required by one skilled in the art to practice the invention is determined by considering factors such as the amount of guidance presented, the state of the prior art, and the presence of working examples. *Ex Parte Forman,* 230 USPQ 546 (Bd. Pat. App. & Int. 1985); *In re Wands*, 8 USPQ2d 1400 (Fed. Cir. 1988). As described in *Wands*, a "considerable amount of experimentation is permissible, if it is merely routine, or if the specification in question provides a reasonable amount of guidance with respect to the direction in which experimentation should precede." *Wands,* 8 USPQ2d at 1404 (quoting *In re Jackson*, 217 USPQ 804 (Bd. Pat. App. & Int. 1982).

According to page 6 of the Action, the applicants give detailed information about bacterial and plant media which can be used for the transformation and regeneration of turfgrass plants and go through a series of steps which results in the production of transgenic turfgrass tissue or plants from seed but fail to give guidance as to which protocols, which media and which steps result in the production of transgenic turfgrass plants. According to

the Action, one skilled in the art would need to do random trial and error experimentation to make and/or use the claimed invention. Applicants respectfully traverse.

Applicants assert that the specification provides sufficient guidance to practice the claimed invention. In fact, the examples section of the specification provides representative protocols that can be routinely followed by a skilled practitioner in order to practice the claimed invention. For instance, example 2 on page 21 of the specification provides the following detailed protocol describing how the applicants transformed and regenerated creeping bentgrass.

needs to be in claim

First, mature seeds of creeping bentgrass were surface sterilized and platedon MMSG medium (page 24, lines 9-11). Methods of surface sterilizing and plating seeds are well known in the art. The components that make up MMSG medium are listed on page 22.

Second, the plates were kept in the dark at room temperature for 3-6 weeks in order to promote de-differentiation. Proliferating calli were selected and transferred to new MMSG medium on a regular basis. Friable and regenerable calli were transferred to new MMSG medium to promote active cell division (page 24, lines 12-21). Methods of promoting de-differentiation and selecting friable callus are well known in the art and are described in sufficient detail for the skilled practitioner to be able to routinely obtain friable callus from turfgrass seeds.

Third, the described *Agrobacterium* strain was streaked from a glycerol stock stored at -80° C and grown at 28° C on plates containing AB medium, supplemented with 10 μg/ml tetracycline and 50 μg/ml spectinomycin. The components that make up AB medium are listed on page 23. After three to six days, cells were scraped from the plate and suspended in modified AAM medium containing 100 μM acetosyringone to and OD_{660} of approximately

0.5. The bacterial suspension was left at 25° C in the dark with shaking for 3.5 hours (page 24, lines 23-32).

Fourth, friable callus was mixed with the pre-induced *Agrobacterium* suspension and incubated at room temperature for 1.5 hours. The contents were poured into a sterile Buchner-funnel containing a sterile Whatman filter paper. A mild vacuum was applied to drain the excess *Agrobacterium* suspension, the filter was moved to a plate containing MMSG medium supplemented with 100 μM acetosyringone, and the plate was stored in the dark at room temperature for three days (page 24, line 33 to page 25, line 8).

Fifth, the co-cultivated calli were rinsed with 250 μg/m cefotaxime to suppress bacterial growth, and placed on agar plates containing MMSG medium containing 200 μg/m hygromycin and 250 μg/m cefotaxime. The calli were kept in the dark at room temperature for 6-8 weeks (page 25, lines 10-17).

Sixth, the hygromycin resistant calli were placed on regeneration medium containing hygromycin and cefotaxime. The proliferating calli were moved to Regeneration Medium 1 (see page 23 for contents), kept in the dark at room temperature for a week, and moved to light for approximately two weeks. Tiny plants were segregated and transferred to deep Petri plates containing Regeneration Medium II (see page 23 for contents) to promote root growth. Hygromycin and cefotaxime were included in the medium. After 2-3 weeks, the plants were moved to plantcons, subsequently transferred to soil, and transferred to pots in a greenhouse to develop into full grown plants (page 25, line 18, to page 26, line 4).

Similar protocols for the transformation and regeneration of tall fescue and velvet bentgrass are provided in examples 3 and 4.

The test of enablement is whether one reasonably skilled in the art can make the invention from the disclosures without undue experimentation. The specification clearly provides detailed examples of how to transform and regenerate various type of turfgrass plants. Using these protocols, and given the state of the art in plant transformation and regeneration procedures, the skilled practitioner could routinely transform any variety of turfgrass plant. One of skill would know how to follow the disclosed protocols and make routine adjustments for optimization with any turfgrass variety without undue experimentation. Similarly, one of skill would know how to test a regenerated plant to confirm that it contains a desired transgene.

The specification combined with the state of the prior art, thus teach the transformation and regeneration of turfgrass plants. The methods of the present invention are therefore enabled as required by the PTO guidelines. Accordingly, applicants respectfully request that the rejections under 35 U.S.C. § 112 be withdrawn.

Second rejection under 35 U.S.C. § 112, first paragraph

Claims 3 drawn to genes from a plasmid of *Agrobacterium tumefaciens* strain 281 is rejected because the specification allegedly lacks sufficient evidence that the claimed biological material is either reproducible, known and readily available to the public, or deposited in compliance with 37 C.F.R. 1.801 to 1.809. In response, applicants submit that the virulence genes obtained from plasmids within *Agrobacterium tumefaciens* strain 281 are well known in the art. For example, see GenBank accession numbers AB027257 or X62885 wherein genes responsible for the supervirulence phenotype of *Agrobacterium* are described.

Claim 4 drawn to plasmid pSB111SH is also rejected because the specification allegedly lacks sufficient evidence that the claimed biological material is either reproducible,

known and readily available to the public, or deposited in compliance with 37 C.F.R. 1.801 to 1.809. Applicants respectfully traverse as example 1 of the specification provides a detailed description on how to construct the pSB111SH plasmid. A skilled practitioner, following the directions provided, would be able to routinely and without undue experimentation construct the plasmid for further use. Methods of creating plasmids are well known in the art.

Rejection under 35 U.S.C. § 102

Claims 1-10 are rejected under 35 U.S.C. § 102(b) as allegedly anticipated by Stalker, U.S. Patent No. 4,810,648. Applicants respectfully traverse.

For a rejection under § 102(b) to be properly founded, a single prior art reference must disclose, either expressly or inherently, each and every element of the claimed invention. *See, e.g., Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 231 USPQ 81 (Fed. Cir. 1986), *cert. denied*, 480 U.S. 947 (1987); and *Verdegaal Bros. V. Union Oil Co. Of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). In *Scripps Clinic & Research Found. v. Genetech, Inc.*, 18 USPQ2d 1001 (Fed. Cir. 1991), the Federal Circuit held that:

> Invalidity for anticipation requires that all of the elements and limitations of the claim are found with a single prior art reference. . . .There must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention. *Id.* at 1010.

Anticipation can be found, therefore, only when a cited reference discloses all of the elements, features, or limitations of the presently claimed invention.

The rejection cites Stalker as the basis for the § 102(b) rejection yet fails to identify in the cited reference any disclosure of methods of producing a transgenic turfgrass plant having the limitations set forth in claim 1. Claim 1 as amended recites the step of "inoculating the

tissue with *Agrobacterium* carrying at least one vector for transformation, the vector comprising virulence genes," yet, the Action fails to identify any suggestion that Stalker teaches the use of virulence genes.

Accordingly, as the Action fails to identify anything in the cited references that teaches each and every element of the present invention, Applicants respectfully request that the rejections under 35 U.S.C. § 102(b) be withdrawn.

The foregoing represents a *bona fide* attempt to advance the present case to allowance. Applicant submits that this application is now in condition for allowance. Accordingly, an indication of allowability and an early Notice of Allowance are respectfully requested

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Limited Recognition Under 37 CFR
§ 10.9(b) Attached

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